

Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) ~~Projection~~ A projection objective of a microlithographic projection exposure apparatus (~~110~~) for imaging a mask (~~124~~) that is disposable in an objective plane (~~122~~) of the projection objective (~~120; 120'; 120"~~) on a photosensitive layer (~~126~~) that is disposable in an image plane (~~128~~) of the projection objective, wherein

- \_\_\_\_\_ the projection objective (~~120; 120'; 120"~~) is designed for immersion operation in which an immersion liquid adjoins the photosensitive layer (~~126~~), ~~and wherein~~

- \_\_\_\_\_ the refractive index of the immersion liquid is greater than the refractive index of a medium (~~L5; 142; L205; LL7; LL8; LL9~~) that adjoins the immersion liquid on the object side, and wherein

~~characterized in that~~

- \_\_\_\_\_ ~~the projection objective (~~120; 120'; 120"~~) is designed in such a way that the immersion liquid (~~134~~) is convexly curved towards the object plane (~~122~~) during immersion operation.~~

2. (Currently Amended) ~~Projection~~ The projection objective according to claim 1, ~~characterized in that~~ wherein the immersion liquid (~~134~~) directly adjoins, during immersion operation, a concavely curved image-side surface (~~136~~) of an optical element (~~L5; L205; LL7; LL8; LL9~~) that is the last optical element of the projection objective (~~120~~) on the image side.

3. (Currently Amended) ~~Projection~~ The projection objective according to claim 2, ~~characterized in that wherein~~ the curved image-side surface (136) is surrounded by a drainage barrier (140).

4. (Currently Amended) ~~Projection~~ The projection objective according to claim 3, ~~characterized in that wherein~~ the drainage barrier is designed as a ring (140) that is joined to the optical element (15) and/or to a housing (141) of the projection objective (120).

5. (Currently Amended) ~~Projection~~ The projection objective according to ~~any one of claims 2 to 4~~ claim 2, ~~characterized in that wherein~~ the curved image-side surface (136) is spherical.

6. (Currently Amended) ~~Projection~~ The projection objective according to claim 5, ~~characterized in that wherein~~ the curved image-side surface (136) has a radius of curvature (R) that is between 0.9 times and 1.5 times ~~and preferably 1.3 times~~ the axial distance (d) between the curved image-side surface (136) and the image plane (128).

7. (Currently Amended) ~~Projection~~ The projection objective according to claim 1, ~~characterized in that wherein~~ an intermediate liquid (142), which is not miscible with the immersion liquid (134) and which forms a curved interface (139, 139') in an electric field, is situated during immersion operation between the immersion liquid (134) and an optical element (15") that is the last optical element of the projection objective (120") on the image side.

8. (Currently Amended) ~~Projection~~ The projection objective according to claim 7, ~~characterized in that wherein~~ the intermediate liquid (142) is electrically conductive and the immersion liquid (134) is electrically insulating.

9. (Currently Amended) ~~Projection~~ The projection objective according to claim 7 ~~or 8, characterized in that~~ wherein the intermediate liquid (~~142~~) has substantially the same density as the immersion liquid (~~134~~).

10. (Currently Amended) ~~Projection~~ The projection objective according to claim 9, ~~characterized in that~~ wherein the immersion liquid (~~134~~) is an oil and the intermediate liquid (~~142~~) is water.

11. (Currently Amended) ~~Projection~~ The projection objective according to ~~any one of claims 7 to 10~~ claim 7, ~~characterized by~~ comprising an electrode (~~146~~) for generating the electric field.

12. (Currently Amended) ~~Projection~~ The projection objective according to claim 11, ~~characterized in that~~ wherein the electrode is an annular conical electrode (~~146~~) that is disposed between the optical element (~~L5~~) and the image plane (~~128~~).

13. (Currently Amended) ~~Projection~~ The projection objective according to claim 11 ~~or 12, characterized in that~~ wherein the curvature of the interface (~~139, 139'~~) ~~can be~~ is configured for being altered by altering a voltage applied to the electrode (~~146~~).

14. (Currently Amended) ~~Projection~~ The projection objective according to ~~any one of claims 7 to 13~~ claim 7, ~~characterized in that~~ wherein the interface (~~139, 139'~~) between the intermediate liquid (~~142~~) and the immersion liquid (~~139~~) is at least approximately spherical.

15. (Currently Amended) ~~Projection~~ The projection objective according to ~~any of the preceding claims~~ claim 1, ~~characterized in that~~ wherein the immersion liquid forms an interface with the medium that is convexly curved towards the object plane in such a way that light rays pass the interface with a maximum angle of incidence whose sine is between 0.5 and 0.98.

16. (Currently Amended) ~~Projection~~ The projection objective according to claim 15, ~~characterized in that~~ wherein the sine of the maximum angle of incidence is between 0.85 and 0.95.

17. (Currently Amended) ~~Projection~~ The projection objective according to claim 16, ~~characterized in that~~ wherein the sine of the maximum angle of incidence is between 0.87 and 0.94.

18. (Currently Amended) ~~Projection~~ The projection objective according to ~~any of the preceding claims claim 1,~~ characterized in that wherein within any arbitrary volume within the projection objective the condition  $(k^2 + l^2)/n^2 \geq K_0 \leq 0.95$  holds, wherein k, l, m are the three direction cosines of an aperture ray, n is the refractive index within the volume with  $k^2 + l^2 + m^2 = n^2$  and  $K_0 = 0.95$ .

19. (Currently Amended) ~~Projection~~ The projection objective according to claim 18, ~~characterized in that  $K_0 = 0.85$~~  wherein within any arbitrary volume within the projection objection the condition  $(k^2 + l^2)/n^2 < 0.85$  holds, wherein k, l, m are the three direction cosines of an aperture ray, n is the refractive index within the volume with  $k^2 + l^2 + m^2 = n^2$ .

20. (Currently Amended) ~~Projection~~ The projection objective according to claim 2, ~~characterized in that~~ wherein the maximum curvature of the image-side surface has a radius of curvature equals the product m's, wherein s is the axial distance between the curved image-side surface and the image plane and m is a real number between 20 and 120.

21. (Currently Amended) ~~Projection~~ The projection objective according to claim 20, ~~characterized in that~~ wherein m is between 40 and 100.

22. (Currently Amended) ~~Projection~~ The projection objective according to claim 21, ~~characterized in that~~ wherein  $m$  is between 70 and 90.

23. (Currently Amended) ~~Projection~~ A projection objective of a microlithographic projection exposure apparatus for imaging a mask on a photosensitive layer that is disposable in an image plane of the projection objective, wherein the projection objective (~~120~~; ~~120'~~; ~~120''~~) is designed for immersion operation in which an immersion liquid adjoins the photosensitive layer (~~126~~), and wherein

~~characterized in that~~

the immersion liquid (~~134~~) forms an interface with a medium (~~LL9~~) that adjoins the immersion liquid on the object side of the projection objective, said interface being convexly curved towards the mask such that the maximum radius of curvature equals the product  $m \cdot s$ , wherein  $s$  is the axial distance between the interface and the image plane and  $m$  is a real number between 20 and 120.

24. (Currently Amended) ~~Projection~~ The projection objective according to claim 23, ~~characterized in that~~ wherein  $m$  is between 40 and 100.

25. (Currently Amended) ~~Projection~~ The projection objective according to claim 24, ~~characterized in that~~ wherein  $m$  is between 70 and 90.

26. (Currently Amended) ~~Projection~~ The projection objective according to ~~any one of the preceding claims~~ claim 1, ~~characterized in that~~ wherein the projection objective (~~120~~) is a catadioptric objective that has at least two imaging mirrors (~~S1~~, ~~S2~~) and in which at least two intermediate images are formed.

27. (Currently Amended) ~~Micro lithographic~~ A microlithographic projection exposure apparatus for producing microstructured components, ~~characterized by a~~ comprising the projection objective ~~(120; 120'; 120")~~ according to ~~any one of the preceding claims~~ claim 26.

28. (Currently Amended) ~~Method~~ A method of microlithographically producing microstructured components, comprising the following steps:

- a) providing a substrate ~~(130)~~ to which a layer ~~(126)~~ of a photosensitive material is at least partially applied;
- b) providing a mask ~~(124)~~ that contains structures to be imaged;
- c) providing a projection exposure apparatus comprising a projection objective ~~(120; 120'; 120")~~ according to ~~any one of claims 1 to 21~~ claim 1;
- d) projecting at least a part of the mask ~~(124)~~ on a region of the layer ~~(126)~~ with the aid of the projection exposure apparatus.

29. (Currently Amended) ~~Microstructured~~ A microstructured component that has been produced by ~~a~~ the method according to claim 28.

30. (New) The projection objective according to claim 2, wherein the optical element is made of quartz glass.

31. (New) A method of microlithographically producing microstructured components, comprising the following steps:

- a) providing a substrate to which a layer of a photosensitive material is at least partially applied;
- b) providing a mask that contains structures to be imaged;
- c) providing a projection exposure apparatus comprising a projection objective according to claim 23;

d) projecting at least a part of the mask on a region of the layer with the aid of the projection exposure apparatus.

32. (New) The projection objective according to claim 1, wherein the projection objective is a catadioptric objective that has at least two imaging mirrors and in which at least two intermediate images are formed.